

A First Version of a Simplified Resistivity Manual

In the days before the experiment

- Check that all the necessary equipment is present:
 - 24 electrodes
 - 24 red cables to connect the electrodes to the switch cables
 - 2 switch cables
 - main Syscal Kid unit
 - handheld GPS
- Charge the resistivity unit (see below for instructions), or make sure it has been charged

Installation

- Keep excellent, well organized notes and take pictures of the site and installation.
- Never force any of the connectors, they should connect/lock easily for this specific set of equipment.
- **Place 24 electrodes in a flat area at equal spacing.** First check and make sure that you can install all 24 electrodes along a straight line. Write down the spacing and its units in your notebook, as well as the GPS locations of the start and end of the line (as well as the GPS reference frame you use).



Figure 1 Properly setup survey

- Make sure the electrodes are well coupled: try and push them 1-2 inches into the ground.
 - If they require the use of a hammer or similar object to insert the electrodes into the ground, the ground may be unsuitable for the survey
 - pounding the electrodes may cause unwanted fractures
- If there are any obvious features along your line (e.g. tree roots, manhole covers, sprinklers, etc.) make a note of them, and list between which electrodes they occur.
- **Lay out the two switch cables.** Make sure the connectors do not get wet and do not drag the connectors along the ground!
 - Start the first cable at the first electrode. Carefully unroll the cable as you move along the line, and connect each electrode (in order) to the switch cable using the red connector cables.
 - Started the second cable at the 13th electrode, not the 24th (this will speed up the dismantling of the equipment later on).
- Connect the switching cable to the electrodes
 - Hook the connectors to the electrodes and to the corresponding spot on the switching cable.
 - The connector should be connected about 2-3 inches from the top of the electrode (Figure 3).
 - The connector and the spot in the switching cable should remain off the ground. This is to prevent them from transferring current to the ground.



Figure 2 Connector to attach an electrode to the switching cable

- **Place the main Syscal unit between the 12th and 13th electrode.** The bottom of the unit should always stay dry, so put it on top of something dry, such as the lid of the bin.



Figure 3 ALWAYS make sure the Syscal KID unit is dry. Even if the ground is dry, it is still good practice to put the unit on the bin lid in order to prevent dirt from getting in the connectors. Note how the electrode and switching cable connector are suspended in the air.

- **Connect the two switch cables to the main unit.** To do this, you first need to remove the protective blue net from the connector (put it back in the bin to keep it from getting lost). Twist the middle ring (dark brown) of the cable connector clockwise, and the top should easily pop off. The connector will only fit onto the main unit in one way, check that the holes and pins line up and hold the connector perpendicular to the unit. Once it fits onto the main unit, twist the brown ring counter clockwise until it clicks/locks. Always keep the connectors dry and put the cap on them if they are not connected to the unit!



Figure 4 The switching cables for the electrodes plug into the front of the Syscal KID unit. the numbers denote which electrodes are hooked up

- **Turn on the unit by flipping up the switch.** Check that there is still some charge (>10%) on the battery, as indicated on the display when you turn the unit on.



Figure 5 Here is the on switch for the Syscal KID unit. It is a toggle switch, and not a rotational switch, despite the knurled knob.

- **Choose a new filename for your experiment.** If you do not do this first, your data will get mixed up into old files. Use the arrow buttons to navigate and the return button to choose. Go to “memory”, and then select the “New” option. Then input a new filename using the up and down button to select a letter or number and the right button to go to the next letter or number. Finish by hitting return. Write down the filename!
- **Set up the experiment parameters.** You should have been returned to the main menu, now choose set-up and set the following parameters (and then return to the main menu):
 - Standard
 - Stack max: 4
 - Stack min: 2
 - q max: 2
- **Set up the experiment type.**
 - Under El. Array, choose Wenner PRF Switch.
 - CC/3 is the electrode spacing. Use up and down arrows to select the correct number and right arrow for the second digit if needed. Hit return when done. Note: you do not need to convert to a specific unit, just make sure to write down what the unit is. Your results will be given to you in these same units!
 - Lvl: 7 is the highest level possible for this experiment type, so set it to 7.

- Node: the number of electrodes, so this should be set to 24.
 - Line: the line number of this experiment, so start with 1.
- **Check the clock/date.** Under the main menu, go to Clock and change the date and/or time if needed. This time and date will be used for your data and files (not a huge disaster if incorrect, but might as well get it right).
- **Start the experiment.** Select start from the main menu. The unit will first check to see that your experiment parameters are OK. It will give an error message if they are not. One common mistake is to choose the level too high for example, for the Wenner PRF it cannot be greater than 7. If an error is found, edit your parameters. Once the parameters are approved, the unit will check that the electrodes are well connected. If it finds an issue, it will stop. You can try and fix the connections by adding a bit of salty water to the soil next to the electrode or push it in deeper. You can choose to skip the electrode if the problem cannot be fixed. If several electrodes fail this test, it's probably better to run the experiment elsewhere...
- **Run the experiment.** The unit will now make measurements for more than 150 different combinations of electrodes. You can keep track by checking the screen. It will first run all possible combinations starting with electrode 1, then with 2, etc. This means that if the screen shows it is now making measurements with electrode 2 as the first electrode, you can remove electrode one from the line, to expedite the dismantling of the experiment.
 - If many of the measurements show high q values, this means large errors or differences between the repeated measurements.
 - The screen shows the number of the current measurements and total measurements, which allows you to determine how much time is left (total time will be about 20 minutes).
- **Check the results file.** When the experiment is completed and the unit returns to the main screen, go to memory and directory, and check that the date and name of the last file are correct.
- **Switch off the unit.**
- **Dismantle the line.** Remove the red cables and electrodes from the main cables first. Then disconnect the cables from the unit, making sure to lock the caps on the connectors and to not get them, or the bottom of the unit, wet. Then start to roll the cables unto the spool. The spool is too small for the cable, so be careful and work slowly and systematically. The cable should be rolled tight, but the part of the cable that connects to the first electrode should not be pulled too tightly unto the spool, because it is starting to crack its cover. If the cable is not rolled correctly onto the spool, it makes the installation next time much more difficult! Move the cable from side to side as you wind it onto the spool, so that its distribution across the spool remains even. Make sure that the first cable connector is fastened to the side of the spool and does not fly around as you are turning the spool! Again, do not drag the connectors across the ground, and do not get them wet!
- **Before you leave, check that you are not leaving anything behind.** Count the electrodes and red cables. Check you have your handheld GPS and notebook. If you brought the bags with the charger and PC adapters, make sure they are still in the bin.

Charging the resistivity (Syscal Kid) unit

- Most importantly, make sure to turn the ventilation screw on the unit when charging to release the gases from the unit, and lock it once done to prevent water from getting into the unit!
- Check that all these items are in the charger bag (also check that you return all these items to the bag when done):
 - Plastic warning sign about ventilation of unit
 - Cable with crocodile clips for charging unit with car battery
 - Power cable + adapter (for European power plug)
 - Cardboard box with charger + charger manual
- **Find an area that is not enclosed and that is not close to an open flame.** The gases released during the charging process may be poisonous and flammable.
- **Turn the white ventilation screw on the unit to let any gases escape from the unit. Turn it counterclockwise until it will not unscrew anymore**
- **Connect the adapter.**
- Connect the power cable with the adapter to the charger cable
- Plug the power cable into the power source
- Remove the cap from the connector on the resistivity unit (top left) and connect the cable.
- The connector only fits one way onto the unit, so line up the pins and holes and hold it perpendicular to the unit; when it fits, turn the ring on the connector so that it locks. Do not be too forceful or impatient, it should lock smoothly and easily! Plug in the adapter cable. A red light should turn on on the adapter.
- **Remove the adapter when charging is complete.** When the adapter light turns green, disconnect the adapter and put everything back in the bag the way it was originally (one cable + manual in cardboard box, keep plug adapter on power cable). Try to avoid keeping the unit on the charger for longer than needed.
- **Turn the white ventilation screw on the unit to lock it, so no water can enter.**

Downloading and reading datafile

Data Transfer and Managing Program

- For the Syscal KID and for the Syscal KID Switch-24, the PC software required for data transfer is PROSYS II. This software allows to transfer, process, and export the data acquired in the field.
- The software needs to be downloaded online:
<http://prosys-ii.software.informer.com>

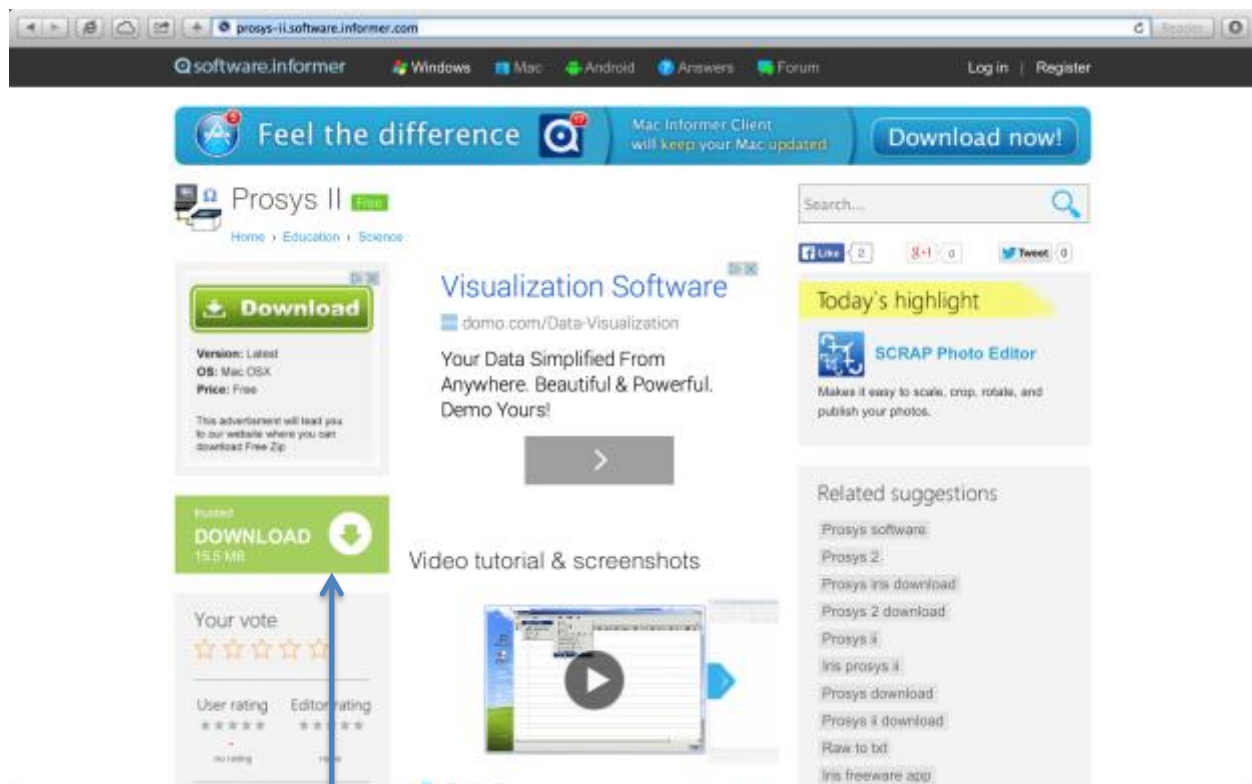


Figure 6 Click this button to begin downloading the ProSYS II software

Click this button to begin downloading the PROSYS II software.

- Once downloaded, run the file.
- Follow the directions for installation on your computer.
- The program will offer then to install the software in a default directory (which can be modified):[C:\Program Files\Iris Instruments\ProsysII]
- Once installation is complete, you can run the program by clicking the “ProsysII.exe” file.

Data Transfer

- To begin transferring data, run the ProsysII software.
- Under the communication tab, set the communication port option to USB [Communication→Communication Port→USB]
- Under the communication tab, set the download to Syscal KID. [Communication→Data Download→Syscal KID Switch]
- Now, turn on the Syscal KID.
- Press the “menu” button
- Scroll down till you go to the memory option
- Select the transfer file by hitting return (↵)

- Browse for your file or input your file name.
- Hit the return button
- Connect the transfer cable to the port in the Syscal KID and then plug the USB end into the computer.



Figure 7 Connect transfer cable here

- - Select "OK" on the USB check
 - Select "OK" on the "Communication" pop up dialog box
 - Select "OK" on the "Syskal" pop up dialog box
 - Transfer will begin, and a progress bar will be displayed.
 - Once the transfer has been finished, the program asks then to label the data file name in which the file will be stored. This file will have the ".bin" extension.
 - You can now disconnect the equipment from the computer
- #If the data download does NOT complete in 10 minutes,
disconnect the unit and restart the download process**

DELETING DATA

The available memory on the SYSCAL KID is 1828. That means it can store 1828 measurement points. Each full survey should use 84. Please note that sometime it will not let you run a survey even if there is adequate room available. I.E. There may be 128 spots open, but it will not allow you to perform a survey. So don't count on using the unit to max capacity. When it comes time to delete data:

- Scroll down to memory and hit return
- Scroll down to Format and hit return
- Select yes and hit return

The unit should be free of data and ready to use now. Verify that it is free of data by:

- Scroll down to memory and hit return
- Go to directory and hit return
- The screen should read:

File: 0

Free memory:

1828/1828